2739

#4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

HANSSON et al

Serial No. 09/467,018

Filed: December 20, 1999

Atty. Ref.: 2380-140

Group: 2739

Examiner: unknown

For: Internet Protocol Handler for Telecommunications Platform with Processor Cluster

* * * * * * * * * * *

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Honorable Assistant Commissioner of Patents
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SUBMISSION OF PRIORITY DOCUMENTS

Sir:

It is respectfully requested that this application be given the benefit of the foreign filing date under the provisions of 35 U.S.C. §119 of the following, a certified copy of which is submitted herewith:

Application No.	Country of Origin	Filed
PCT/IB98/02080	IB	18 December 1998

Respectfully submitted,
NIXON & VANDERHYE P.C.

March 3, 2000

By: _____
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PATENT COOPERATION TREATY (PCT)

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CERTIFIED COPY OF THE INTERNATIONAL APPLICATION AS FILED AND OF ANY CORRECTIONS THERETO

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International Application No. / Demande internationale n° **PCT/IB98/02080**

International Filing Date / Date du dépôt international **18 December 1998 (18.12.98)**

Geneva/Genève,
04 February 2000
(04.02.00)

International Bureau of the World Intellectual Property Organization (WIPO)

Bureau International de l'Organisation Mondiale de la Propriété Intellectuelle (OMPI)

J.-L. Baron
Head, PCT Receiving Office Section
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PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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PCT / IB 9 8 / 0 2 0 8 0
International Application No.

18 DECEMBER 1998 (18. 12. 98)
International Filing Date

INTERNATIONAL BUREAU OF WIPO
PCT International Application
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) P11196WO1

Box No. I TITLE OF INVENTION

Telecommunication 15

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no state of residence is indicated below.)*

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State *(that is, country)* of nationality: Sweden

State *(that is, country)* of residence: Sweden

This person is applicant for the purposes of: ☒ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no state of residence is indicated below.)*

This person is:

☐ applicant only

☐ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

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☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

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Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

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Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked):*

Regional Patent

☒ **AP ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT

☒ **EA Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

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☒ **OA OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired,specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line):*

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Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

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Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

PCT / IB 98 / 02080

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application *(day/month/year)*	Number of earlier application	Where earlier application is: national application: country	regional application: * regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): _____

** Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*

ISA /EPO

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*

Date *(day/month/year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	4
description (excluding sequence listing part)	:	10
claims	:	1
abstract	:	
drawings	:	
sequence listing part of description	:	
Total number of sheets:		15

This international application is **accompanied** by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other *(specify)*:

Figure of the drawings which should accompany the abstract:

Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

ERICSSON RADIO SYSTEMS AB
Common Patent Department

Mats Sjöberg

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1. Date of actual receipt of the purported international application: 18 DECEMBER 1998 (18. 12. 98)
2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA / EP
6. ☒ Transmittal of search copy delayed until search fee is paid

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Supplemental Box *If the Supplemental Box is not used, this sheet should not be included in the request.*

*1. If, in any of the Boxes, **the space is insufficient** to furnish all the information: in such case, write "Continuation of Box No. ..." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:*

*(i) **if more than two persons are involved as applicants and/or inventors** and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;*

*(ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication **"the States indicated in the Supplemental Box"** is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;*

*(iii) if, in Box No. II or in any of the sub-boxes of Box No. III, **the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America**: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;*

*(iv) if, in addition to the agent(s) indicated in Box No. IV, there are **further agents**: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;*

*(v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication **"patent of addition,"** or **"certificate of addition,"** or if, in Box No. V, the name of the United States of America is accompanied by an indication **"continuation"** or **"continuation-in-part"**: in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;*

*(vi) if, in Box No. VI, there are **more than three earlier applications whose priority is claimed**: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;*

*(vii) if, in Box No. VI, **the earlier application is an ARIPO application**: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed.*

*2. If, with regard to the **precautionary designation statement** contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.*

*3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning **non-prejudicial disclosures or exceptions to lack of novelty**: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.*

Statement concerning non-prejudicial disclosures or exceptions to lack of novelty

Documents disclosing the present invention were stolen on 14.12.98. The theft was reported to the police and a statement taken (police statement no. K322178-98).
We request all of the designated Offices to consider that any disclosure as a result of this theft to be considered to be a non-prejudicial disclosure as provided for under their national laws.

DESCRIPTION

See next page.

CONFIRMATION COPY

: ERA/RM/T Göran Hansson
ERA/RM/T Staffan Andersson
ERA/RM/T Helene Ringenson

Distribute to: ERA/LX/PT Monica Magnusson

Invention Disclosure: Distributed IP Service

Based on: : LT/SU-94:5227 "Guide For Inventors":

Inventor:..... Date:.....

Read and Understood By:..... Date:.....

Read and Understood By:..... Date:.....

1 Name of the Invention

Distributed IP-Services

2 Inventor(s)

ERA/RM/T Göran Hansson
ERA/RM/T Arne Lundbäck

3 Background

The Cello 2 platform is equipped with a central processing resource called the main processor cluster (MPC) that is built out of a number of cooperating main processors (MPs). Each MP is equipped with an Ethernet interface and a switch port interface, the latter connecting the MP to the space switch that all Cello boards are connected to.

A Cello based node is also typically equipped with a number of ET-boards interfacing ATM links. These ET-boards are also connected to the switch in the same manner as the MPs.

Requirements put on Cello states that Cello shall contain IP-router functionality. The Cello platform shall support IP over Ethernet and IP over ATM. This means it shall be possible to connect to the router via IP-links carried either on Ethernet interfaces on th MPs or ATM-interfaces on the ETs. It shall also be possible to connect external IP-based equipment to a node by utilizing both type of interfaces.

Each node shall have one (1) IP-address for all applications, e.g. HTTP, Telnet, Corba, SNMP, FTP etc. An application is always hosted by the MPC.

The MPC mechanisms will in case of a processor fault move any service executing on the faulty processor to another processor with the goal to maintain executing of that service. THis willl also apply to IP-applications.

Most of the components described in this disclosure are expected to be delivered by ENEA/OSE-Delta System. ERA/RM has put requirements on these components in order to get the needed functionality according to Cello requirement specifications.

Inventor:..... Date:.....

Read and Understood By:..... Date:.....

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4 State of the Art

In a multi processor system each processor has an IP-address closely tied to the HW and Ethernet interface of that processor. The processors will together form an LAN. IP-traffic will be routed to/from these processors either by a dedicated router connected to the same LAN or by one of the processors of the LAN running special router SW.

Each processor has its own set of applications (called management services in Cello). Therefore the applications get the addresses that is assigned to the processor.

5 Problem

It is not desirable to apply the common approach to Cello due to the cluster ideas of the MPC. The cluster appears to an external viewer as well as for apllication SW executing in the cluster environment as one single processing resource. The fact that the cluster actually consists of several processors is only known by the control system.

Therefore Cello must implement mechanisms that:

- can handle IP-applications on different processors all having the same address,
- ensures the presence of a router always connected to all IP-links defined for the router, i.e. the router function shall be tolerant against processor failure,
- makes the Ethernet interfaces of the MPs exchangeable; i.e. one shall not consider which processor that is hosting the service one want to access when selecting Ethernet interface to connect the MS to,
- makes it possible to reach any IP-application by using ATM transport,

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disregarding hosting processor.

6 Solution

The solution has three parts:

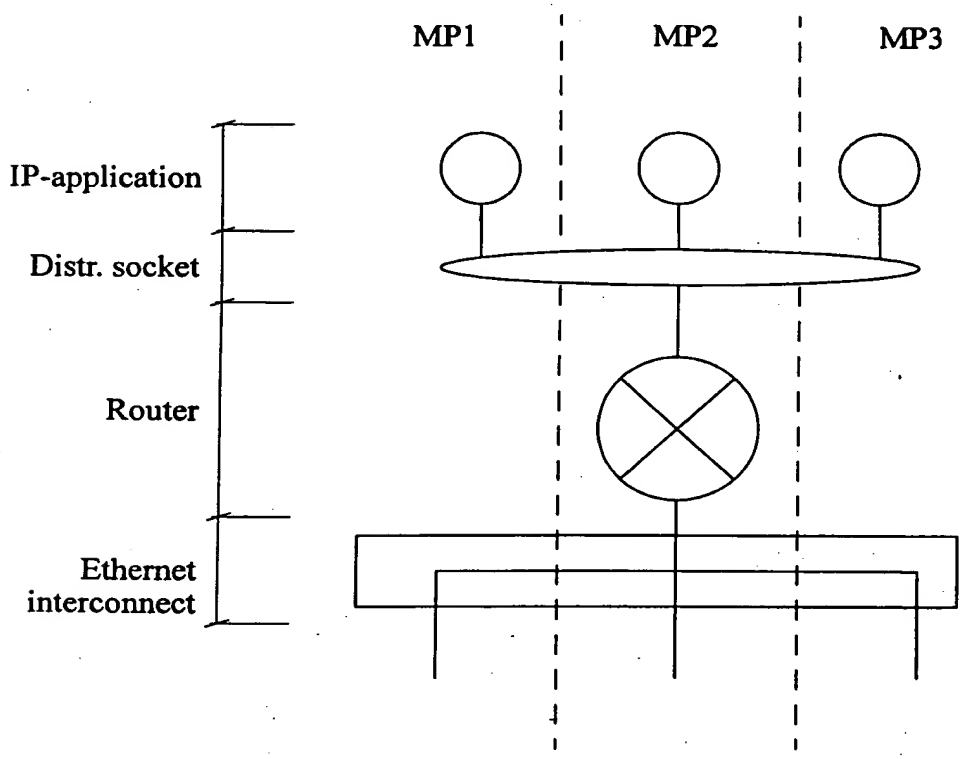
- Distributed socket interface enabling management service SW to access the single IP-stack of the node from any processor.
- An Ethernet interconnect mechanism will pass all Ethernet frames, no matter which interface that receives them to the same router port in one copy. An IP-packet addressed to an host of the LAN shall be sent on the LAN in one copy.
- An active and standby router together with mechanisms that automatically redirect attached IP-links (socket, ATM, Ethernet) in case of a redundancy switch over.

Inventor:..... Date:.....

Read and Understood By:..... Date:.....

Read and Understood By:..... Date:.....

The principle over how these functions relates to each other is shown bellow:



Distributed socket

The distributed socket mechanism consists of one part (distributed part) located to the processor where the management service is running and one part (central part) located to the processor which hosts the IP-layer (router). The data transport through the socket between these parts is carried by OSE-Deltas link handler.

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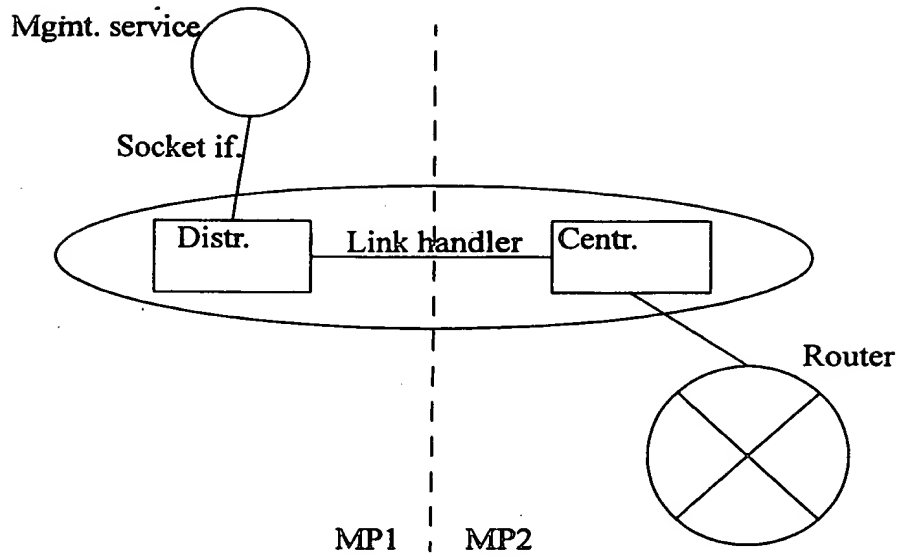

The distributed part contains mainly the TCP/UDP state machine and socket primitives according to Berkley standard socket. The management service behave in relation to this part in the same way as towards a normal socket.

In case of a failure of MP1 Cello will ensure that the management service is restarted on MP2 or any other processor of the MPC. The management service will then bind to the distributed part on that processor in the common manner. (The distributed part is present on all processors, including the one hosting the central part.)

The main part contains IP-adaption and a table with all used TCP/UDP ports and their localization (hosting processor). The IP-header is handled by this part. The main part also supervises all processors that hosts an active management service (i.e. has a used port).

In case of failure of a service hosting processor, the central part will remove corresponding entries from its table and stop supervising that processor.

If the processor hosting the central part itself fails, the central part will be started on a new processor (the one hosting the standby router) and will then attach to all used ports in the MPC and fabricate a new table on that processor

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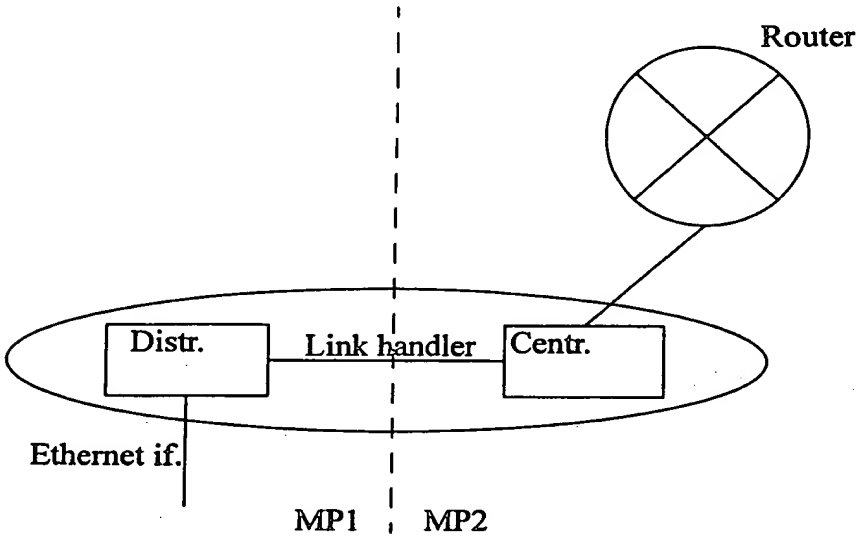
(as an alternative, it is possible to replicate the table from the active router processor to the standby while maintaining the table on the active processor).

Ethernet Interconnect (Needs further investigation)

Also the Ethernet interconnect mechanisms consists of a central and distributed part which uses OSE-Delta's link handler to communicate with each other.



The distributed part handles the Ethernet frames and forwards the payload of a received frame to the central part and/or assembles payload received from the central part into a frame and forwards it to the interface. The distributed part is tied to the physical interface. *[How is the ARP protocol handled?]*

The central part is responsible to detect if more than one MP are connected to the same LAN. This can be achieved by sending "management packages" on the LAN and detect on which interface they will appear. The central part shall in those cases pick one of the interfaces to be the active one and only forward the user packets to the distributed part tied to that interface. If only one MP is connected to the LAN the central part forwards the packets to all interfaces. *[Do the central part need to remove duplicated received packages?]*

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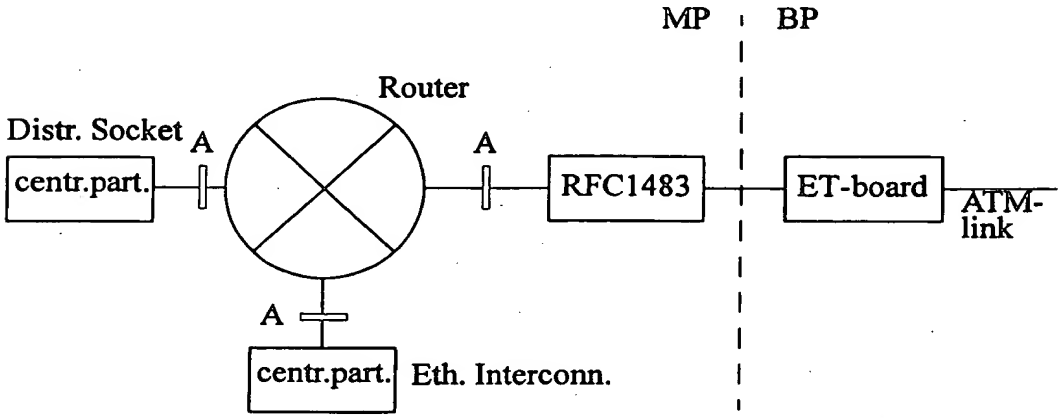
The router works in a context of several types of connected links: Ethernet interconnect central part, distributed socket central part, and adoptions to ATM links (RFC1483).



In case of processor failure of the MP hosting the active router, the following scenario takes place:

1) The standby router on another MP is activated.
2) The central parts of distributed socket and Ethernet interconnect will be activated on the same processor as the standby router as described in corresponding sections.
3) The RFC1483 process will be moved by activating Cello's cluster mechanisms. The ATM link from the ET-board will be moved together with the process to the same processor (i.e. the standby router processor).
4) The RFC1483 will re-attach to the router on the new processor by utilizing mechanisms in interface A according to specification by OSE-Delta.
5) The standby router will start collecting routing data from the network in order to re-build its routing table *[Alt. The standby router will reuse the*

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routing table maintained by the active router.]

7 Merits of the Invention

Cello will with this invention gain an MPC that behave like a cluster regarding the IP-services of Cello. The main idea is to make the MPC look like a single processor (compare with a workstation). The benefits are:

- The MPC will have one IP-addresses that addresses all management services of the MPC no matter which processor that currently hosts the different services.
- Management service programmer does not have to be aware of the different processors, he will merely create and bind to a socket in the common way and do not need to consider questions regarding program localization.
- Each individual Ethernet interface will be useful when connecting external LAN to a Cello node.
- It is possible to connect more than one Ethernet interface to the same LAN which may be desirable considering robustness aspects.
- It will always be routing functionality present in the Cello node.

8 Enclosures

—

9 Claims Proposal

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Inventor: ..... Date: .....

Read and Understood By: ..... Date: .....

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CLAIM

1. A system,

c h a r a c t e r i s e d in that said system includes means for telecommunication.